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THE NEBULAR LINE 3869 IN R AQUARII

After the discovery by Dr. P. W. Merrill of the presence of the bright nebular lines 5015, 4957 and 4363 A in the spectrum of the variable star R *Aquarii*, a spectrogram of this object was secured at Mount Hamilton, on November 3, 1919, with a one-prism spectrograph (linear dispersion at $H\gamma$ 1 mm. = 57 A) and the 36-inch refractor. The spectrogram, obtained with an exposure of three and a half hours, is of good density from 3868 to 5167 A. It shows, in addition to the nebular and hydrogen lines described in Dr. Merrill's paper in this number of the PUBLICATIONS, the bright nebular line, whose wave-length as determined by Wright,[1] from measures in the spectra of the gaseous nebulae, is 3868.9 A (Rowland).

Mount Hamilton, J. H. MOORE.
November 10, 1919.

COMMENTS ON THE OCCURRENCE OF NEBULAR LINES IN THE SPECTRUM OF R AQUARII

The discovery by Dr. Merrill of three of the brighter nebular lines in the spectrum of R *Aquarii*, an otherwise typical star of Class Md, is of the highest interest. It appears to be the first recorded instance of the association of peculiarly nebular lines with the spectrum of a red star, and is possibly of significance as establishing contact between these two classes of objects. The occurrence of the bright lines of hydrogen, and possibly of helium, in their spectra, has long been recognized as an outstanding peculiarity of the red variables, but the characteristically nebular lines have, until now, been looked for in vain. On the other hand there is abundant evidence connecting the gaseous nebulae with the white or "hot" stars, particularly with that extreme group, the Class O, or Wolf-Rayet stars. Since these, on the one hand, and the red variables, on the other, appear to have nothing else in common, it is going to be somewhat disconcerting if both groups are found to be related to the gaseous nebulae.

As the matter stands, there can be no question as to the presence of the four nebular lines: N_1, N_2, 4363, and 3869 A (the last of these having been observed by Dr. Moore, as stated elsewhere in this issue) in the spectrum of R *Aquarii*. Dr. Merrill's observations of the shortness of the nebular lines is confirmed by plates secured with the slitless spectrograph attached to the Crossley telescope

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[1] *Pub. Lick. Obs.*, **13**, 242, 1919.